CALIFORNIA STATE UNIVERSITY
FULLERTON
COLLEGE OF ENGINEERING
AND COMPUTER SCIENCE

TITANS OF TRANSFORMATION

BIG IDEAS

Digital Homelessness Initiative

Big Ideas to Transform Tomorrow

"At its purest state, Big Ideas is about creating a better future... tackling deep-seated problems, responding to our communities, establishing access to innovative curriculum, and preparing the next generation of culturally competent engineers and computer scientists."

The Titans of Transformation: Big Ideas initiative is focused right here in our region, tackling adaptive challenges that affect the health, stability, and quality of life of people in our communities.

The College of Engineering & Computer Science recently embarked on this bold and disruptive initiative, which features Big Ideas – built from the ground up – that inspire collaborations, investments, and positive impacts that position the college at the nexus between challenges and opportunities.

Purpose-driven, community-connected, investment-worthy research defines our inaugural Big Ideas. These projects, led by faculty champions committed to a deeper engagement with our communities and enhanced opportunities for our students, seek to address fundamental societal challenges through transformative collaboration and innovation.

Through private support, Big Ideas will take ideas from good to exceptional, drive innovation, and spark next-level collaborations that will generate new knowledge, powerful solutions, and positive change.

Susan Barua
Dean of the College of Engineering & Computer Science

Big Idea: Digital Homelessness Initiative

Approximately 17 out of every 10,000 people in the U.S. experience homelessness, according to the Department of Housing and Urban Development Point-in-Time Count in 2019.

That same survey showed that California accounts for a disproportionate 27 percent of the nation's homeless population. A recent study also showed that 1 in 10 of California State University's own students have experienced homelessness.

Shelters and transitional housing can help – to an extent. But Anand Panangadan, assistant professor of computer science at Cal State Fullerton's College of Engineering & Computer Science, says expanding technological solutions will enhance the pursuit to end homelessness.

"At a meeting that included Larry Haynes, executive director of Mercy House, a major provider of supportive housing in Orange County, we discussed the role of technology in addressing homelessness," Panangadan says. "Some technological innovations could actually detract from long-term solutions to homelessness, but technology applied to meet community needs could be beneficial."

To ensure his ideas about leveraging technology to end homelessness are sustainable, Panangadan is collaborating with other investigators and taking his ideas to the people who need them most. "Since our meeting with Mercy House, we have visited one of their supportive housing complexes to get a sense of the environment and community we will be working with," he says.

A TRANSFORMATIONAL OPPORTUNITY

One way to end homelessness is to provide permanent supportive housing (PSH), Panangadan explains. PSH is long-term, community-based housing targeted to individuals and families with a qualified disability who have experienced long-term or repeated homelessness. PSH makes it easier for people to access supportive services such as connections to community-based healthcare, treatment, and employment services, and research has proven that it is a cost-effective intervention to reduce homelessness. Technology can help make PSH more effective.

"We believe that the appropriate use of technology in permanent supportive housing can make it easier for residents to access services and reduce the cost of providing those services," Panangadan says. His proposal involves combining the benefits of human outreach and adaptive technology in applications like telehealth assessments for mental health needs, smart supportive spaces, and a digital identity initiative. His project will also provide service-learning opportunities for ECS and other Cal State Fullerton students.

"Establishing telehealth, including tele-mental health counseling, within supportive housing could be one way to reduce the cost of and increase accessibility to health services," Panangadan says. "Digital identities can help people keep track of all the paperwork – like Social Security cards, veterans benefits information, and insurance cards – that are required to access services, while ensuring their information is kept private and secure. And smart supportive spaces are modifications to living spaces that can increase safety and reduce costly repairs, such as automatic shutoffs for the water supply in case of a plumbing overflow."

Panangadan emphasizes that ensuring privacy is critical to any of these research initiatives. The issue is more complex in communal housing since multiple people share the living space.

"In addition, residents in supportive housing should not feel that refusing to participate in any research activity might jeopardize their living situation," he says. "Explaining the purpose of the research, what data will be collected, and who will see the data are important parts of informed consent."

Panangadan believes Cal State Fullerton can play an impactful role in addressing the complex challenges of homelessness.

"Engineering and computer science faculty and students can introduce technology to reduce the costs associated with operating supportive housing, while social scientists can ensure that these technologies are applied with consideration of the communities' wishes and examine their broader societal impact."

WHAT WE'RE DOING

Within ECS, Panangadan is collaborating with Kiran George, professor of computer engineering, on this Big Idea initiative. Outside ECS, he has begun working with Tabashir Nobari, assistant professor of public health; Yuko Okado, assistant professor of psychology; Debra Stout, Executive Director of the Fullerton Collaborative and professor in the College of Health & Human Development; and Benjamin Henwood, associate professor of social work at USC.

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As part of the Fullerton Collaborative, Cal State Fullerton supports its mission to build and support a healthy community for all Fullerton residents through four initiatives: health and wellness; education; next-gen youth empowerment (formerly at-risk youth); and homelessness.

"The Fullerton Collaborative's Task Force on Homelessness is devoted to bringing education about homelessness and its solutions to all districts in Fullerton. Furthermore, we want to mobilize the community toward advocacy for solutions that will make Fullerton better for all," Stout says. "Within the Fullerton Collaborative, we build the bridges and connect resources to the faith community, educators, organizations, government, and businesses. Cal State Fullerton's Digital Homelessness Initiative will support effective relationships with the City of Fullerton, and we look forward to seeing its relationship with the task force grow."

Panangadan and his team have already established relationships with supportive housing providers, like Mercy House, some of which also provide their own in-house healthcare services.

"Accessing mental health services can be challenging for individuals experiencing homelessness, for a variety of reasons. The ability to remove some of these barriers by offering services using modern technology and within the safety of someone's own home is significant," says Linda Wilson, Chief Housing Officer at Mercy House. "This has become even more apparent during the COVID-19 pandemic, which has led to increased isolation and loneliness for so many. If successful, this study and partnership may have important implications for mental health treatment options for both people who are homeless and other vulnerable populations."

The future is ripe for collaborative research and student engagement that supports our partnership with Mercy House and other potential direct providers.

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> **Anand Panangadan**

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Both the computer science and computer engineering programs at ECS also cover some areas of the internet of things (IoT), and applications of IoT have become increasingly popular for computer engineering senior design projects.

"IoT projects bring together a variety of technologies, like sensors and data processing, so it is likely that digital homelessness projects can make use of IoT skills," Panangadan says.

"Most importantly, we must prepare our students to be ready to tackle the issues facing their communities," he continues. "With a strong foundation in the fundamentals of engineering and computer science plus service-learning experiences that reveal the impacts of their applications on real people, our graduates will be poised to address these challenges in ways that were not even considered before." ●

Anand Panangadan, assistant professor of computer science, researches the applications of machine learning and methods to automatically analyze data for specific real-world applications.

Let's Get Started Today

Permanent supportive housing is an evidence-based and cost-effective solution that could help end homelessness. Supportive services are essential, as PSH residents frequently live with a variety of disabling conditions – including physical disabilities, mental health conditions, substance use issues, and trauma from domestic abuse. Technology can serve as an important tool to better understand and provide support for people experiencing homelessness. These solutions – and the education necessary for their adoption among vulnerable populations – require interdisciplinary collaboration; continuing innovation; significant time commitments from faculty, student, and community partners; and financial support.

Panangadan's Digital Homelessness Initiative includes a three-year plan with layers of investments to:

- Perform essential community- and campus-based research
- Develop and research technological solutions
- Engage undergraduate and graduate students through service and research opportunities
- Help the team establish and maintain partnerships with community collaborators

Your support would have a direct impact on positioning Cal State Fullerton as a leader in the push to reduce and resolve homelessness – one of our society's greatest challenges.

For partnership and investment opportunities, please contact **Michael Karg** at **mkarg@fullerton.edu** or **714-519-8160**.

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